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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/854,206	05/11/2001	David S. Pecora	00-0737.00/US	7849

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Micron Technology, Inc.
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EXAMINER

TRAN, BINH X

ART UNIT	PAPER NUMBER
1765	2

DATE MAILED: 04/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/854,206

Applicant(s)

PECORA, DAVID S.

Examiner

Binh X Tran

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05-11-2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In line 7, of claim 9, "said silicon nitride layer" lacks antecedent basis. The examiner suggests replacing "said silicon nitride layer" with --said layer of silicon nitride-- so that it is consistent with previous term in line 4 (i.e. "a layer of silicon nitride").

In line 8 of claim 9, "said silicon dioxide layer" lacks antecedent basis. The examiner suggests replacing "said silicon dioxide layer" with --said layer of silicon dioxide-- so that it is consistent with previous term in line 3 (i.e. "a layer of silicon dioxide").

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application

published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

4. Claims 1, 8, 9 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Mao et al. (US 5,877,073).

Respect to claim 1, Mao discloses a method for etching the silicon nitride layer (20) with an etchant consisting essentially of oxygen at the flow rate of 50 sccm (within applicant's range of 20-80 sccm) and CHF_3 at 20 sccm (within applicant range of 5 sccm to 25 sccm) (col. 3 lines 50-67). The examiner clearly recognizes that Mao also teaches argon in the etching composition with oxygen and CHF_3 . However the examiner interprets the transitional phrase "consisting essentially of" limits the scope of a claim to the specified materials steps "and those that do not materially affect the basic and novel characteristic(s)" of the claimed invention (See MPEP 2111.03). Since argon is an inert gas, therefore argon does not materially affect the basis and novel characteristics of the etching process.

Respect to claims 8-9, Mao teaches the method comprising the step of:

providing a semiconductor wafer assembly comprising a silicon wafer (10) and a layer of silicon dioxide (12) overlying the silicon wafer;

forming a layer of silicon nitride(20) over the silicon wafer and the layer of silicon dioxide (12);

etching the silicon nitride layer using an etch consisting essentially of oxygen and CHF_3 to expose the silicon dioxide and silicon wafer (col. 3 lines 50-67, Fig 3).

Respect to claim 11, Mao teaches oxygen at the flow rate of 50 sccm (within applicant's range of 20-80 sccm) and CHF_3 at 20 sccm (within applicant range of 5 sccm to 25 sccm) (col. 3 lines 50-67).

5. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Bosch et al. (US 5,626,716).

Bosch disclose a method for etching a layer of silicon nitride (15) comprising:
etching the silicon nitride layer (15) with an etchant consisting essentially of oxygen at the flow rate of 70-110 sccm (within applicant range of 20-80 sccm) and CHF_3 at the flow rate of 10-20 sccm (within applicant's range of 5-25 sccm) (col. 6 lines 1-13).

6. Claim 8 is rejected under 35 U.S.C. 102(b) as being anticipated by Lou et al. (US 5,872,045).

Lou discloses a method comprising the steps of:
providing a semiconductor wafer assembly comprising at least one of a layer of silicon (10) and a layer of silicon dioxide (12);
forming a layer of silicon nitride (14) over said at least one of the layer of silicon and the layer of silicon dioxide (col. 4 lines 35-45, Fig 6);
etching the silicon nitride with an etchant consisting of oxygen and CHF_3 ,
wherein the etch expose the silicon dioxide layer (col. 4 lines 50-55).

7. Claim 8 is rejected under 35 U.S.C. 102(e) as being anticipated by Klein et al. (US 6,046,088).

providing a semiconductor wafer assembly comprising a layer of silicon (10);

forming a layer of silicon nitride (12) over the layer of silicon (Fig 2);
etching the silicon nitride with an etchant consisting of oxygen and CHF₃,
wherein the etch expose the silicon dioxide layer (col. 4 lines 50-55).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 2-7, 10, 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mao.

Mao teaches to use CHF₃ at 20 sccm and oxygen at 50 sccm, power at 525 watts. Claims 2-7, 10, 12-16 differ from Mao by the specific flow rate ratio, pressure, specific flow rate of CHF₃, O₂ and power. These parameters are result-effective variables. These parameters are commonly determined by routine experiment. The process of conducting routine optimization experiments so as to produce an expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Mao by perform routine experiment to obtain optimal flow rate ratio, flow rate of CHF₃ and O₂, pressure, power as an expected result.

10. Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch.

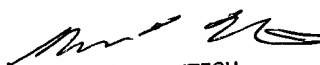
Claims 2-7 differ from Bosch by the specific flow rate ratio, pressure, power, specific flow rate of CHF₃ and O₂. These parameters are result-effective variable. These parameters are commonly determined by routine experiment. The process of conducting routine optimization experiments so as to produce an expected result is obvious to one of ordinary skill in the art. Hence, it would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Bosch by perform routine experiment to obtain optimal flow rate ratio, flow rate of CHF₃ and O₂, pressure, power as an expected result.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X Tran whose telephone number is (703) 308-1867. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Binh X. Tran
April 19, 2002


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